CLAIMS:

1. An ultrasonic transducer, comprising:

a housing;

acoustic elements arranged in said housing;

an integrated circuit arranged in said housing adjacent said acoustic elements;

first connection means for connecting said acoustic elements to said integrated circuit; and

second connection means for connecting said integrated circuit to electrical transmission lines, connection sites for said first and second connection means being arranged on a common surface of said integrated circuit.

2. The ultrasonic transducer of claim 1, wherein each of said first and second connection means are comprised of at least one of metal bumps, solder bumps, polymer bumps, thin-line bonding, z-axis conductive elastomeric connectors, z-axis conductive adhesive, z-axis conductive film and reflow solder.

3. The ultrasonic transducer of claim 1, wherein said first connection means are comprised of at least one of metal bumps, solder bumps, polymer bumps, thin-line bonding, z-axis conductive elastomeric connectors, z-axis conductive adhesive, z-axis conductive film and reflow solder, and said second connection means are different from said first connection means and are comprised of at least one of wire-bonds, direct wire attachments and tab bonding of leads.

4. The ultrasonic transducer of claim 1, wherein said second connection means comprise an intermediate interconnection substrate comprising a thin film circuit, ceramic circuit, laminate circuit technology.

5. The ultrasonic transducer of claim 1, wherein said second connection means comprise an intermediate interconnection substrate comprising a flexible circuit, a semi-rigid circuit or a rigid circuit.

6. The ultrasonic transducer of claim 5, wherein said interconnection substrate is bent such that a vertical size of an assembly of said acoustic elements, said integrated circuit and said interconnection substrate is less than seventy-five percent of a horizontal length of said integrated circuit.

7. The ultrasonic transducer of claim 5, wherein said interconnection substrate is bent such that a vertical size of an assembly of said acoustic elements, said integrated circuit and said interconnection substrate is less than fifty percent of a horizontal length of said integrated circuit.

8. An ultrasonic transducer, comprising:

a thermally-conductive body;

a flexible circuit bent at least partially around said body;

an acoustic assembly connected to said flexible circuit;

electronic components for controlling said acoustic assembly; and

connection means for connecting signal transmission lines to said flexible circuit, said acoustic assembly, said electronic components and the signal transmission lines being connected in a circuit defined in part by said flexible circuit.

9. The ultrasonic transducer of claim 8, wherein said flexible circuit is bent around said body such that a first portion of said flexible circuit is on a first side of said body and a second portion of said flexible circuit is on a second side of said body opposite said first side of said body.

10. The ultrasonic transducer of claim 9, wherein said acoustic assembly is arranged on said first portion of said flexible circuit and said electronic components are arranged on said second portion of said flexible circuit.

11. The ultrasonic transducer of claim 8, wherein said acoustic assembly is arranged in contact with said body.

12. The ultrasonic transducer of claim 8, wherein said body defines a cavity, said electronic components being arranged on said flexible circuit and in said cavity.

13. The ultrasonic transducer of claim 8, wherein said flexible circuit has a 180° bend around said body such that a first portion of said flexible circuit is arranged on a first side of said body and a second portion of said flexible circuit is arranged on a second side of said body opposite said first side of said body.

14. The ultrasonic transducer of claim 8, wherein said acoustic assembly includes acoustic elements and an integrated circuit electrically coupled to said acoustic elements, said flexible circuit having connection sites and said integrated circuit having connection sites, further comprising wire-bonds connecting said connection sites of said integrated circuit and said connection sites of said flexible circuit.

15. The ultrasonic transducer of claim 14, wherein two rows of said wire-bonds are formed along each of a pair of opposed edges of said integrated circuit.

16. The ultrasonic transducer of claim 8, wherein said flexible circuit has a plurality of bends about said body.

17. The ultrasonic transducer of claim 8, wherein said flexible circuit has first and second planar portions on opposite sides of said body separated by a 180° bend and first and second terminal end portions each separated from a respective one of said first and second planar portions by a 180° bend.

18. The ultrasonic transducer of claim 17, wherein said connection means comprise two additional flexible circuits, each having connections for signal transmission lines, and conductive film adhesive attaching each of said additional flexible circuits to a respective one of said first and second terminal end portions of said flexible circuit.

19. The ultrasonic transducer of claim 18, wherein said flexible circuit has a flap portion separated from said first planar portion of said flexible circuit by a 180° bend, said

connection means further comprise one additional flexible circuit having connections for signal transmission lines and conductive film or adhesive attaching said additional flexible circuit to said flap portion of said flexible circuit.

20. The ultrasonic transducer of claim 8, wherein said flexible circuit has a planar portion on one side of said body and a flap portion separated from said planar portion by a 180° bend, said connection means further comprise an additional flexible circuit having connections for signal transmission lines and conductive film or adhesive attaching said additional flexible circuit to said flap portion of said flexible circuit.

21. The ultrasonic transducer of claim 8, wherein said flexible circuit has first and second planar portions on opposite sides of said body separated by a 180 ° bend and a first terminal end portion separated from said first planar portion by a 180° bend, said second planar portion of said flexible circuit being a terminal portion of said flexible circuit.

22. The ultrasonic transducer of claim 21, wherein said connection means comprise an additional flexible circuit having connections for the signal transmission lines, and conductive film adhesive attaching said additional flexible circuit to said flexible circuit.

23. An ultrasonic transducer, comprising:

a flexible circuit having connection sites;

an acoustic assembly mounted on said flexible circuit and comprising an integrated circuit having connection sites and acoustic elements electrically coupled to said integrated circuit;

electronic components for controlling said acoustic assembly to transmit and receive ultrasonic waves, said acoustic assembly and said electronic components being connected in a circuit defined in part by said flexible circuit; and

wire-bonds connecting said connection sites of said integrated circuit and said connection sites of said flexible circuit.

24. The ultrasonic transducer of claim 23, wherein said wire-bonds are formed along only a portion of the periphery of said integrated circuit.

25. The ultrasonic transducer of claim 23, wherein two rows of said wire-bonds are formed along each of a pair of opposed edges of said integrated circuit.

26. A method for manufacturing an ultrasonic transducer, comprising the steps of:
arranging an acoustic assembly on a flexible circuit;

coupling electronic components for controlling the acoustic assembly to the acoustic assembly via the flexible circuit;

coupling signal transmission lines to the flexible circuit such that the electronic components, the acoustic assembly and the signal transmission lines are connected in a circuit defined in part by the flexible circuit; and

bending the flexible circuit at least partially around a thermally-conductive body to form at least one 180° bend about the body with the acoustic assembly being vertically spaced from the electronic components.

27. The method of claim 26, wherein the acoustic assembly and electronic components are arranged on the flexible circuit when the flexible circuit is in a flat form and the body has cavity, the flexible circuit being bent to place the electronic components in the cavity.